overlies the "ferretto" crust of a moraine of the second glaciation. In the evening, Riva, at the head of the Lake of Garda, was reached by steamer.

On the 20th the party took train to Innsbruck. The following day was spent in examining the deposits at Hötting, close by the town.

The breccia of Hötting, considered by Penck a cemented cone of dejection or talus of rock-fragments, contains fossil plants (all but four of existing species). It overlies one moraine and underlies another, and is held to indicate an inter-glacial epoch.

On the 22nd Munich was reached, and some most interesting sections at Höllriegelskreut, seven and a half miles south of the city, were examined. Three successive fluvio-glacial deposits were seen, superposed one upon another, each corresponding to a separate glaciation. Here again the weathered (though not red) crust of the older fluvio-glacial deposits underlies the unaltered lower part of the succeeding deposit. The oldest of the three deposits (viz. the Deckenschotter, *alluvion des plateaux*) consists here almost exclusively of limestone pebbles, which are so solidly cemented together as to form a conglomerate used as a building stone.

The 23rd (last day of the excursion) was rainy, but the morainic amphitheatre of the Isar glacier around the Starnberger (Würm) See, near Munich, was examined as far as the weather would permit, and at the close of the excursion all members joined in an enthusiastic vote of thanks to its most excellent conductors.

B. HOBSON.

NOTES.

A FEW weeks ago the Paris *Figaro* opened a subscription list in order to enable the Pasteur Institute to supply Dr. Roux's anti-diphtheria serum to all medical applicants. The appeal has resulted in a sum equivalent to about £10,000 being raised. It is hoped that institutes in which experienced physicians will administer the cure will soon be established. The Paris Academy of Medicine has reported in favour of Dr. Roux's treatment.

WE learn with much regret that Mr. George Knott died at Cuckfield, Hayward's Heath, Sussex, on the 8th inst., at the age of fifty-eight. He was an eminent authority upon double and variable stars, to the observation of which he devoted his astronomical life. So long ago as 1861 he read his first paper before the Royal Astronomical Society, the subject being the variable star R. Valpecula. From that date to April 1892, when he communicated a series of observations of the magnitude of Nova Aurigæ, he contributed no less than twenty-four papers to the Society. In 1877 he completed a valuable series of micrometrical measures of double stars, taken by himself between 1860 and 1873. For many years he was a member of the Council of the Society. He was highly respected by his fellow workers, not only for his astronomical labours, but also for his sterling character. His death will be deeply regretted by all who were acquainted with him.

FROM a circular bearing the imprint of the University of Minnesota, Minneapolis, we learn that Mr. Clarke Barrows proposes to supply a complete up-to-date reference to all zoological literature by means of a card catalogue arranged alphabetically by authors, and supplemented with a subject catalogue. It is proposed to begin the catalogue with the current volumes of the more important periodicals devoting the whole, or a portion, of their space to zoology, to print the new titles as they appear, and take up the back volumes as rapidly as possible. It is hoped that arrangements will soon be made to get the titles of all other important zoological writings, and thus a catalogue of all the zoological literature not recorded in the "Bibliotheca Zoologica" up to 1861 will be produced. Each card will have printed upon it the name of the author of a zoological paper, the full title of the paper, and the name and date of the periodical in which it was published. The cards will be punched so that they can be stacked in drawers with a wire through them. They should be of great assistance to curators of zoological libraries.

THE Sunday Lecture Society will commence a new series of lectures next Sunday afternoon, at St. George's Hall, Langham Place, when Sir B. W. Richardson, F.R.S., will discourse on "Muscle and Athletic Skill."

THE steam yacht *Windward*, with Mr. Jackson's party on board, which left Archangel on August 5, is reported by the captain of a Norwegian walrus-hunting vessel, but the news is vague, being without exact dates, and the ship does not appear to have been "spoken." She was first seen about the middle of August off Matochkin Schar, the strait separating the two islands of Nova Zembla, where the ice was very heavy; and again about the end of August in lat. 75° 45′ N., and long. 44° E., steaming up a clear lead through rotten ice in the direction of Franz Josef Land.

MR. A. TREVOR-BATTYE and Mr. Hyland landed on the island of Kolguef, south-west of Nova Zembla, at the end of last June, with the special object of studying the ornithology of the island. His companion, Mr. Powis, returned for him in the steam-yacht *Saxon* on August 6, but not finding him at the landing place considered further search unnecessary and returned. Another Arctic steam-yacht made a remarkably cautious attempt to reach the island at a later date, but returned unsuccessfully, and Mr. Trevor-Battye has been left behind to face the Arctic winter without an adequate outfit. It is probable that when the winter ice unites the island to the continent, he will be able to cross to the mainland, a distance of less than sixty miles, and thence travel overland to St. Petersburg by sledge. It is to be hoped that he will be able to bring back his collections, which should be of considerable scientific value. A rescue expedition is proposed by Captain Battye-Trevor, but it is doubtful whether it can be carried out by sea at this advanced date. There seems no reason for anxiety, as game is usually plentiful on Kolguef, and there are habitable houses used temporarily in summer by Russians and Samoyedes.

WE have received a letter, written by Lieut. Peary to the President of the American Academy of Natural Sciences, which contains more detailed accounts of his expedition last season. When on the ice-cap in the spring of 1894, the average air-temperature experienced for forty-eight days was −31°·5 F., and the average wind velocity for forty-three days 15·9 miles an hour. During the worst weather there were thirty-four hours with an average temperature of −50° F. and a minimum of −62°, the average wind velocity being 48·1 miles per hour. The experience has convinced Mr. Peary that the human frame can stand any degree of natural cold without permanent injury. He intends to spend the coming winter in studying the Eskimo dog, and devising means to keep this invaluable animal alive and in health during extreme cold. There has evidently been some friction amongst the members of the exploring party, most of whom seem to have had enough of Arctic hardships, as the leader refers to the two men who remain with him as those who "decline to desert." The letter concludes: "You may rest assured that I shall not return until I have done everything that is possible for one who believes in ultimate success, and whose every fibre is in sympathy with and straining for the desired end."

WE are always glad to welcome any journal having for its object the extension of scientific knowledge; hence we note with pleasure the publication of the first number of the *Agricultural Journal of the Leeward Islands*, edited by Mr. C. A. Barber, the Superintendent of Agriculture at St. John's, Antigua, West Indies. The journal will ensure the rapid and wide publication of the results of investigations of interest to West Indian planters. It will be the medium through which the work carried on in the Government laboratories, and in experimental and botanical stations of the West Indies, will be made public. But besides being the organ of the scientific officers of the Government, the journal will contain reports of the proceedings of the agricultural societies in the colony, and facts of interest connected with the agriculture, natural history, and meteorology of the different islands will be recorded. To the number before us, the editor contributes some notes on the nature of the irritating ticks from which the cattle of the West Indies suffer. The journal also includes an article on the planting of eucalyptus trees; one on hurricanes, by Mr. F. Watts; and a third, on coffee planting in the Leeward Islands. The editor hopes to keep the journal scientific throughout, although it must be made eminently practical. We hope and believe that this addition to periodical literature will take a permanent stand among the scientific journals of the tropics.

THE current number of the *Comptes-rendus* contains a paper by M. R. Blondlot, on the propagation of electromagnetic waves in ice, and on the specific inductive capacity of this material. In a previous communication the author had shown that for turpentine and castor-oil the wave-length of the radiation given out by an oscillator, in these substances, is the same as in air; and enunciated the general law that the wave-length depends only on the dimension of the oscillator, and not on the medium in which the oscillator is plunged. There was, however, considerable doubt whether this law would be found to hold in the case of ice, for M. Bouty had found that the specific inductive capacity of ice was 78, that is enormously greater than in the case of any other dielectric. The apparatus employed consisted of two copper wires stretched horizontally and parallel at a distance apart of 80 cm. A resonator made of gilt copper, the same as that employed in the previous experiments on liquids (*Comptes-rendus*, July 25, 1892), was placed between these wires; the portion of the wires beyond the resonator pass through a wooden trough four metres long. This trough being empty, a bridge is moved along the wires beyond the resonator till the sparks disappear, the distance between the bridge and the resonator then being equal to the quarter wave-length of the resonator. The resonator is then surrounded with a water-tight bag filled with freshly-boiled distilled water, which is then frozen. The quarter wave-length is now found to be greater than before, in the ratio of 141 to 100. The trough is then filled with water which is frozen, and by breaking away the ice the place at which the bridge has to be placed in order to stop the sparking found. The wave-length under these conditions is exactly equal to that obtained when the resonator and wire are surrounded by air. The experiment was repeated four times, using resonators of different capacity, and in every case gave the same result. The results obtained can be utilised for calculating K the specific inductive capacity of ice, and give for K the value 2, which value the author considers correct to within about $\frac{1}{20}$. M. Blondlot having mentioned the above result to M. Pérot, who, working by means of electric oscillations, had found a very high value for K in the case of ice, the latter examined his results, and found that he had made an error in the formula he employed. Having applied this correction to his results, he now obtains the value 2·04 for the specific inductive capacity of ice.

A RECENT number of the *Atti della Reale Accademia dei Lincei* contains a paper, by M. Ascoli and F. Lori, on the radial distribution of the induced magnetism in an iron cylinder. The authors have investigated this question experimentally, using cylinders of different lengths in magnetic fields of varying strength. The cylinders employed were composed of 127 iron wires, each of 0·095 cm. in diameter. These wires were regularly arranged round a central wire in layers containing 6, 12, 18, 24, 30, and 36 wires respectively. Between each of the layers was wound a coil of fifty turns of fine insulated copper wire. By means of a series of mercury cups either of these six coils could be connected to a ballistic galvanometer. The authors find that for long cylinders (50 cm.) the distribution is practically uniform, while in the case of shorter cylinders there is an increase in the induction as you pass from the axis to the circumference. This increase is particularly noticeable in the case of short cylinders (5 to 10 cm.), and is greater in the case of strong than of weak inducing fields.

IN the *Journal* of the Scottish Meteorological Society (No. x. third series), Dr. Buchan has published a very valuable discussion of the mean monthly and annual rainfall of Scotland for the twenty-five years 1866 to 1890. He points out that of all the climatological elements, rainfall calls for the greatest number of years' observations in obtaining fairly approximate averages. The period of twenty-five years now dealt with, for a large number of stations, and for the same years, may well be accepted as a sound basis for discussion. In addition to the tables, and a discussion of the principal features of each month, the depth of rain for each month and for the year is shown on coloured maps. The part of Scotland where the rainfall is smallest is the low-lying district round the Moray Firth, where the annual amount varies from 23 to 26 inches, the absolutely dryest place being Nairn. Three parts of Scotland have an annual rainfall of upwards of 80 inches, viz. the south-western half of Skye, the highest mean annual fall being 92 inches, at Sligachan. To the west of the Caledonian Canal, in the central parts of Ross-shire and Inverness-shire and the north of Argyll, the average at some stations exceeds 100 inches; and to the south-east of the canal the averages are still larger, amounting to over 127 inches in Glencoe. The work will be referred to as the standard authority on the rainfall of Scotland, and when the publication of similar returns for the United Kingdom, now being prepared by the Meteorological Council, is complete, the distribution of the rainfall of these islands will be fairly accurately determined.

AT a recent meeting of the Berlin Physical Society, Herr E. Pringsheim exhibited some examples of the application of photography to the deciphering of "palimpsest" manuscripts. A manuscript contained in the Royal Library at Berlin, on which the process was tested, showed the second writing intensely black, while the older writing, washed off as much as possible to make way for the new, was larger, and showed a yellow tint. The problem was to bring out in a photograph the feeble yellow writing without the later black manuscript, and this was accomplished as follows. A negative was first obtained through a yellow screen, using a long exposure and a flat development. This showed the older writing only very feebly, and the later very well. Another negative was taken with an ordinary bromide plate, was developed into a hard image, and used to obtain a diapositive. This transparency showed both writings with approximately equal intensity. The transparency was then placed upon the first negative so tha the two images coincided. In this case the background was dark in one case and light in the other, as was also the later manuscript. The latter therefore was imperceptible. But the older manuscript was dark in both cases, so that it appeared alone in the combination as an intensely black writing on a shaded ground. The greatest difficulty met with was that of obtaining two perfectly congruent negatives. An apparatus suitable for this purpose, in which the object and the camera were fixed in a definite position in an iron stand, was provided by Herr H. C. Vogel at the Potsdam Astrophysical Laboratory. But perfect coincidence was only obtained on taking the second negative through a glass plate of the same thickness as the yellow glass used for the first.

The calendar of the University College, Nottingham, for the fourteenth session, 1894-95, has been published; and also the calendar of the University College of North Wales.

Part iii. of vol. vii. of the *Proceedings* of the Bristol Naturalists' Society has just been issued. It contains some of the papers read before the Society during the session 1893-94, and a portrait and short biographical notice of Dr. John Beddoe, F.R.S.

Prof. Frank Clowes and Mr. J. Bernard Coleman, of University College, Nottingham, have written a new work on "Elementary Qualitative Analysis," specially for the use of beginners. The book will be published by Messrs. Churchill, early in December.

Messrs. Longmans and Co. have just published "A Shilling Arithmetic," by J. Hamblin Smith, which is suitable as an introduction to the same author's "Treatise on Arithmetic." The book contains short explanations of arithmetical processes and a large number of simple examples.

Messrs. Macmillan have in preparation a "Popular History of Celestial Photography," by Mr. R. A. Gregory and Mr. Albert Taylor. The book will be divided into twelve sections, each of which will trace the development of the application of photography to a particular branch of astronomical inquiry.

The *Electrician* Printing and Publishing Co. has lately published the substance of the lecture on "The Work of Hertz," delivered by Prof. Oliver Lodge at the Royal Institution on June 1, and fully reported in these columns on June 7. Twenty-three illustrations have been introduced into the text, and abstracts of the work of some of Hertz's successors are given in appendices.

A monograph of the land and freshwater mollusca of the British Isles, by Mr. J. W. Taylor, is in the press, and will shortly be issued. There will be two volumes, the first of which will be devoted to a general treatment of the subject, and the second to the treatment of species individually. Intending subscribers should communicate with Messrs. Taylor Bros., Sovereign Street, Leeds.

The physical properties of soils are very inadequately described in most text-books. With a view of enabling teachers of agricultural classes to do fuller justice to this part of their subject, Prof. R. Warington, F.R.S., has drawn up a few "Brief Notes on the Physical and Chemical Properties of Soils" (Chapman and Hall). The notes will doubtless prove of great assistance to the science teachers for whom they are intended.

Messrs. George Newnes (Limited) announce that they propose to issue a series of little books dealing with various branches of scientific knowledge, and treating each subject in clear concise language, as free as possible from technical words and phrases. The following three volumes will be issued immediately:—"The Story of the Stars," by Mr. G. F. Chambers; "The Story of the Earth," by Prof. H. G. Seeley, F.R.S.; "The Story of Primitive Man," by Mr. Edward Clodd.

Students of human anatomy should find Mr. Gordon Brodie's "Dissections Illustrated," the third part of which has just been published by Messrs. Whittaker and Co., an invaluable handbook. The dissections illustrated and described in the new part refer to the head, neck, and thorax. There are twenty remarkably fine coloured plates, drawn and lithographed by Mr. Percy Highley, and eight diagrams. The plates are drawn so clearly, and they are so large (five are full size and the rest two-thirds natural size), that the muscles, vessels, and nerves of each dissection can be found without any difficulty.

Shortly before the fifth international congress of geologists, a "Geological Guide-book for an Excursion to the Rocky Mountains" was prepared by a number of geologists familiar with the different parts of the region visited, and was edited by Mr. S. F. Emmons. This book has been extracted from the *Compte rendu* of the congress, and is now published separately by Messrs. Kegan Paul, Trench, Trübner, and Co. A number of illustrations have been added to the original, and also many bibliographical references. The result is a capital account of the chief points in the geology of one of the most interesting regions of the world.

A report on meteorological observations in British East Africa for 1893, by Mr. E. G. Ravenstein, has been received. The meteorological records, of which a summary is presented in the report, refer to seven stations on or near the coast, and two in the interior. At all these stations the temperature, rainfall, and other climatological factors have been recorded, and in the case of five of them the records embrace at least one year. Observations of the rainfall only have been recorded at four other stations. Mr. Ravenstein recognises that the observations are as yet far too scanty and imperfect to enable the true means of the temperature, rainfall, and humidity to be deduced.

Dr. Harrison Allen has revised and brought up to date his valuable "Monograph of the Bats of North America." The original work was issued nearly thirty years ago by the Smithsonian Institution, and has remained the only work on the subject. The progress made in systematic zoology since that time, however, rendered it desirable to prepare a new edition. The monograph just distributed by the Institution is essentially new. Dr. Allen has added to the species, elaborated the descriptions, and introduced several novel features. These changes have increased the usefulness of a very important work, and they will be welcomed by students of what is recognised to be a difficult group of animals.

Mr. Gisbert Kapp has revised and largely rewritten his work on the "Electric Transmission of Energy" (Whittaker and Co.), the fourth edition of which was published last week. Changes were rendered necessary on account of the enormous developments which have taken place in every branch of electric power transmission since the third edition was published. The author has omitted a large amount of the descriptive matter, and has given a greater amount of space to the theoretical part of his subject. Among the omissions are "the historical account of power transmission, detailed descriptions of plants, comparison of electric with other systems of transmission, underground cables, electric tramways, and telpher lines." Altogether the book, as at present constituted, is more scientific, and less a trade catalogue than formerly.

Messrs. J. J. Griffin and Sons have recently published the third edition of their illustrated and descriptive catalogue of chemical apparatus. A few of the new instruments are worthy of notice. For instance, a new pattern of Tate's air-pump, described in the catalogue, has been designed with valves at each end of the barrel so that no air can exist between them and the pistons, hence, at each stroke, all the air contained in the barrel is expelled. Metallurgists will be interested in a new form of gas furnace capable of carrying on operations at a white heat without the aid of a blower; the power of the furnace may be judged from the fact that one pound of cast iron can be melted in thirty-five minutes. A cathetometer which enables the operator to turn the telescope in any direction without moving the instrument bodily, is another noteworthy feature. Arnold and Hardy's apparatus for the estimation of sulphur in steel and steel-making iron; benzoline blast furnaces attaining a temperature of 2100° F.; Prof. Roberts-Austen's electrical pyrometer; and many other pieces of apparatus, for use in teaching and research, have been introduced into the catalogue.

A considerable addition to our knowledge of the chemical history of hydrazine or diamide and its derivatives is contributed by Prof. Curtius, its discoverer, and his assistants, to the current issue of the *Journal für praktische Chemie.* An interesting account is given of the position of diamide as a salt-forming base, and its relations in this respect to ammonia and the fixed alkalies. Diamide itself, $\begin{array}{l}NH_2\\ |\\ NH_2\end{array}$, is an extremely unstable substance, so much so that it is still doubtful whether the anhydrous gas has yet been obtained, or is even capable of separate existence. On the other hand, the liquid hydrate, $N_2H_4.H_2O$, is a very stable substance, as Prof. Curtius has long ago shown. It is interesting to note that this is the opposite of what is the case with ammonia, where the gas itself is stable and the hydrate particularly unstable. Moreover, while ammonia is a mon-acid base, diamide is di-acid; and just as we accept the idea of a hypothetical ammonium radicle NH_4, so we are bound likewise to admit the conception of a divalent radicle $\begin{array}{l}NH_3\\ |\\ NH_3\end{array}$, which Prof. Curtius terms diammonium, in the hydrazine salts. Thus the normal chloride of hydrazine is $\begin{array}{l}NH_3Cl\\ |\\ NH_3Cl\end{array}$ and the sulphate $\left.\begin{array}{l}NH_3\\ |\\ NH_3\end{array}\right>SO_4$. Diammonium would thus seem to be analogous to the divalent metals of the alkaline earths, and the parallel would appear to be further justified by the sparing solubility of the sulphates and their inability to form alums with sulphates of the alumina group. On the other hand, diammonium exhibits properties which point to a close similarity to the alkali metals. For the hydrate behaves in by far the greater number of instances as a mon-acid base, like ammonium hydrate. The neutral chloride above mentioned, $N_2H_6Cl_2$, decomposes below 100° into hydrogen chloride and the chloride N_2H_4HCl, which cannot be made to lose more hydrochloric acid without destruction of the base. The hydrate $N_2H_4.2H_2O_2$ is only capable of existence in solution; it passes on evaporation into the hydrate $N_2H_4.H_2O$, which latter substance boils without decomposition. Dry ammonia gas only displaces half the acid of the sulphate $N_2H_4.H_2SO_4$, and leaves the stable sulphate $(N_2H_4)_2H_2SO_4$. Moreover, Prof. Curtius has only succeeded in preparing one nitrate, $N_2H_4.HNO_3$, and one thiocyanate, $N_2H_4.SCNH$. Hence he concludes that diammonium is capable of acting both in a monovalent capacity as $(N_2H_5)'$, and as a divalent radicle $(N_2H_6)''$, the former resulting in the production of the more stable salts.

Prof. Curtius has succeeded in preparing a large number of double salts containing diammonium, and describes them in a separate memoir in conjunction with his assistant, Herr Schrader. Ammonium, as is well known, forms three classes of double salts containing sulphuric acid, namely, the alums, the double sulphates with $6H_2O$, and the peculiar and as yet little understood salts usually formulated as $R''SO_4.nNH_3$ in which the anhydrous gas is assumed to enter into combination with the metallic sulphate. All efforts to obtain alums containing diammonium sulphate, $N_2H_6SO_4$, have so far failed: but salts of the other two types, containing the more stable sulphate $(N_2H_5)_2SO_4$, are readily obtained. It is somewhat singular, however, that they contain no water of crystallisation, a fact which is possibly explained by the difficult solubility of the compounds. The divalent metals present may be copper, nickel, cobalt, iron, manganese, cadmium or zinc, but not magnesium. They are at once precipitated upon mixing concentrated solutions of the metallic sulphate and diammonium sulphate. It is further remarkable that the latter may be either of the two sulphates of diammonium; indeed, the solution may contain free sulphuric acid. Moreover, the sulphate $N_2H_6SO_4$ is difficultly soluble, while the more stable sulphate $(N_2H_5)_2SO_4$ is deliquescent, and yet the sparingly soluble double salts always contain the deliquescent diammonium sulphate. In addition to these, salts of the type $R''SO_4.2N_2H_4$ and $R''SO_4.3N_2H_4$ have been obtained; in those of the former type R'' may be zinc or cadmium, corresponding to the ammonia compounds $R''SO_4.4NH_3$, and in those of the latter type nickel or cobalt, these salts being analogous to the well-known compounds $NiSO_4.6NH_3$ and $CoSO_4.6NH_3$. In direct opposition to the ammonia compounds, the salts containing anhydrous hydrazine are almost perfectly insoluble in water.

The additions to the Zoological Society's Gardens during the past week include two Pig-tailed Monkeys (*Macacus nemestrinus*, ♂ ♀) from Java, a Vervet Monkey (*Cercopithecus lalandii*, ♀) from South Africa, presented by the Rev. Sidney Vatcher; a Rhesus Monkey (*Macacus rhesus*, ♀) from India, presented by Mr. E. Logan; a White-backed Piping Crow (*Gymnorhina leuconota*) from Australia, presented by Miss Vincent; a Manx Shearwater (*Puffinus anglorum*) from Cornwall, presented by Mrs. E. S. Smith; two Robins (*Erithacus rubecula*), South European, presented by Mr. A. T. Binny; a Chameleon (*Chamæleon vulgaris*) from North Africa, presented by Mr. W. L. Strong; a Deadly Snake (*Trigonocephalus atrox*) from Trinidad, presented by Dr. A. Strading; a Yak (*Poëphagus grunniens*, ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

The Rio de Janeiro Observatory.—The Brazilian National Observatory, situated on the Morro do Castello, the most easterly hill of Rio de Janeiro, is to be removed. The *American Meteorological Journal* reports that the unfavourable situation of the Castello for astronomical observations has led to the selection of a site across the bay, near Petropolis, at an elevation of about 3500 feet. A road is now being built up the mountain, and it is hoped that the new observatory will be completed within two years. The sum of five hundred thousand dollars has been voted by the Government for the installation.

Observations of Mars.—The current number of the *Observatory* contains a short article in which Mr. Stanley Williams directs attention to certain important features of Mars, which, it will be remembered, is in opposition on Saturday. With regard to the canals or channels, he remarks that a few points upon which observations are desirable are: "How far is the visibility of the canals in different parts of the planet affected by seasonal changes? Their duplication, when does it occur? How long does it last? How does it occur? And again, how far is it subject to seasonal changes?" Mr. Williams commenced observations in the latter part of August, and he found